

Progress Report for work in 2003 on

Canebrake Ecosystem Restoration

respectfully submitted to

Strawberry Plains Audubon Sanctuary & Dahomey National Wildlife Refuge

by

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PURPOSE OF RESEARCH

A greater than 98% decline in *A. gigantea* canebrake communities has resulted in a critically endangered ecosystem (Noss et al. 1995). Historical accounts suggest loss of canebrake habitat has resulted in the extirpation (and perhaps extinction) of many species (Remson 1986, Conover 1994, Judziewicz et al. 1999, Brantley and Platt 2001, Platt et al. 2001). Thus, canebrake restoration is necessary for maintaining and enhancing biodiversity in the southeastern United States. Because canebrakes provide a habitat for a diversity of fauna, including endangered species of butterflies (Platt et al. 2001) and avifauna, such as Swainson's warbler (Graves 2001), and because so little is known about the ecology of cane, research is needed to determine factors affecting this unique ecosystem (Thomas et al. 1996).

Historical accounts of canebrakes suggest that they were widespread on floodplains and stream terraces (moist soils, but not inundated for long periods of time) throughout the southeastern United States and tolerated a variety of environmental conditions (Caplenor 1968, Gilliam and Christensen 1986, Baskin et al. 1997, Nelson 1997, Platt and Brantley 1997, Fickle 2001, Fralish and Franklin 2002). However most of the canebrake habitat has been lost due to lack of fire disturbance, replacement by cultivated fields, or use as domestic livestock feed (Hughes 1966, Platt and Brantley 1997). Thus, the current distribution of cane does not necessarily imply its physiological or ecological tolerances for certain environmental conditions. One hint may be the tendency for cane to grow along the edges of forests, suggesting cane is intolerant of shade and perhaps other competition.

To gain a greater understanding of environmental constraints on canebrakes, two experiments were developed. The first experiment tests the affects of competition on *A. gigantea* growth, specifically examining transplanted individuals. We hypothesized that *A. gigantea* would have greater numbers of new shoots and greater growth (height) of new shoots when competition was controlled. The second experiment tests the hypothesis that cane growth is limited by shading under full canopy forests. We hypothesized new shoot numbers and growth would increase following canopy thinning.

METHODS

Drawing from the methods of Platt and Brantley, experiments were developed transplanting *A. gigantea* harvested from the edge area of canebrakes. At both the Strawberry Plains Audubon Center and Dhomey National Wildlife Refuge, initial experiments were set up to determine if competition affected new shoot number of growth of giant cane. Rhizomes were extracted from nearby sites, trimmed to approximately 50 cm and the attached culms trimmed to a minimum of three sets of branches (approximately 1 to 1.5 m), and kept moist until planted. A total of 289 propagules were transplanted at the Strawberry Plains Audubon Center in blocks of 16 plants, spaced at 0.5 m intervals in a 4 X 4 grid (about 9 m²). The soil at the transplant site was prepared by tilling to a depth of about 20 cm. The rhizomes were planted to a depth of 15 to 20 cm. Plants were subsequently mulched with straw. Each plant comprised one experimental unit, and every other plant was treated with a competition cloth (landscape fabric) to control competitive vegetation. When data were collected, we weeded around the no competition plants. At Dhomey NWR, 109 rhizomes were transplanted, but no mulch was used. The care of these plants (maintenance of control treatment was difficult). Number of new culms and culm height were monitored on monthly intervals for three months.

A second study examines the effects of canopy thinning on can growth. One area of existing *A. gigantea* was designated and an addition area set up at the Meeman Biological Field Station, TN (n=2). Within each area were a control site and a site that underwent overstory thinning. The thinning was accomplished by girdling the surrounding trees, thus inhibiting leaf growth. Within the control and the treatment sites, twelve 2m x 2m plots were located in a stratified (to position plots throughout each site and spaced at least 2 m apart) random manner. Density of new and old shoots and diameter measurements were recorded pre-treatment and post-treatment. We will calculate the change in numbers of total shoots and numbers of new shoots for each plot, and then averaged all twelve plots within a site prior to analyses (n=2). Analysis of variance (ANOVA) was used to examine the change in number of total shoots, the change in number of new shoots, and the change in average diameter affected by the thinning treatment.

RESULTS & DISCUSSION

Survivorship was greater than 50% at both sites, but varied quite a bit among plots. Reasons for the variation were not clear. Survivorship was noticeably greater at the Strawberry Plains Audubon Center compared to the Dhomey National Wildlife Refuge, potentially linked to either soil differences (DNWR has a much more clayey soil, and thus poorer drainage) or mulching that occurred only at Strawberry Plains.

The number of new shoots was also greater at Strawberry Plains, but there was no significant difference between control plants and those with competition minimized (Fig. 1). However, the height of new shoots (i.e., new shoot growth) was significantly larger when competition was minimized at the Strawberry Plains site (Fig. 2). The relationship did not hold at the DNWR.

Only pre-data have been collected thus far on the thinning sites.

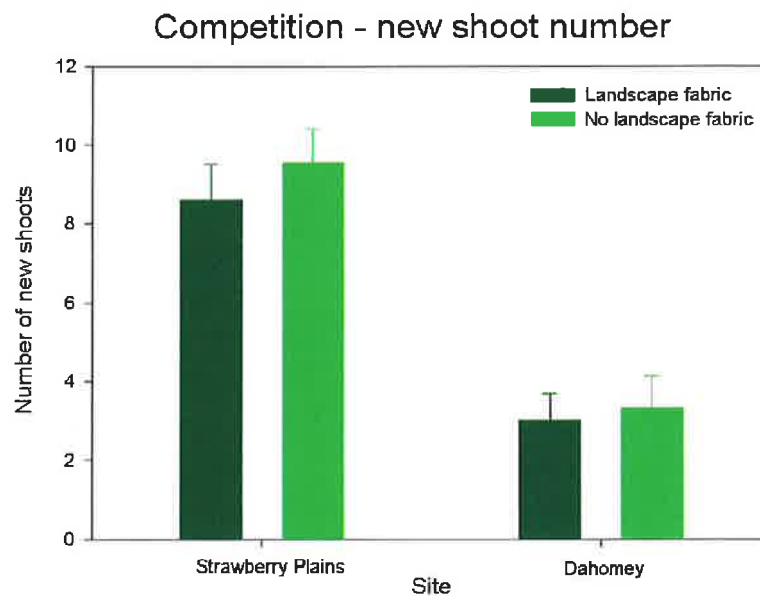


Figure 1. Number of *Arundinaria gigantea* new shoots after three months of growth following transplantation. Data are from two locations, Strawberry Plains Audubon Center and Dahomey National Wildlife Refuge, MS. The landscape fabric treatment minimizes competition for the transplants.

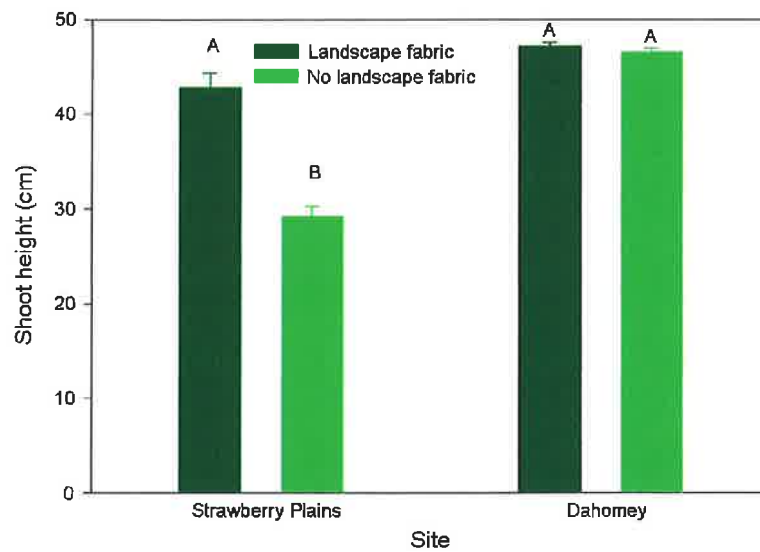


Figure 2. New shoot height of *Arundinaria gigantea* after three months of growth following transplantation. Data are from two locations, Strawberry Plains Audubon Center and Dahomey National Wildlife Refuge, MS. The landscape fabric treatment minimizes competition for the transplants.

CONTINUED EFFORT

The above are preliminary results of an ongoing study. More cane rhizomes will be transplanted in both areas over the dormant season and additional experiments developed. We will also continue to monitor those transplants already established. We plan to be more thorough in controlling competition at DNWR. Canopy thinning will occur in the spring 2004, and post-thinning data will be collected the following summer.

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